

# Groundwater Remediation Project makes progress

Fluor Hanford's Groundwater Remediation Project has begun operating an expanded groundwater extraction and treatment system in the 200 West Area, west of the TX Tank Farm and north of the Plutonium Finishing Plant (PFP). Four new extraction wells have been added to a set of five wells that have operated for the past nine years to extract groundwater contaminated with carbon tetrachloride.

The four new wells, the deepest of which is 400 feet, are needed to capture the north end of a 2,000 micrograms per liter (ug/L) plume of carbon tetrachloride believed to have originated from trenches and cribs (a Hanford term for ground disposal sites for liquid wastes, used in the past) surrounding PFP. Concentrations of carbon tetrachloride in groundwater in the plume today sometimes exceed 4,000 (ug/L). (A microgram is a measure of parts per billion.)

An interim Record of Decision, agreed to by the Department of Energy, Washington State Department of Ecology, and the U.S. Environmental Protection Agency, calls for groundwater concentrations to be reduced to below 2,000 ug/L. Later, a final agreement may set a different standard. The permissible concentration level for carbon tetrachloride in drinking water is 5 ug/L.

The carbon tetrachloride contamination stems mainly from historical operations at Recuplex and the Plutonium Reclamation Facility (PRF) processes used at the PFP complex where plutonium-bearing scraps were dissolved in corrosive chemicals to recover the plutonium. Recuplex and the PRF used tributyl phosphate diluted with carbon tetrachloride to extract the plutonium. Liquid wastes containing carbon tetrachloride were discharged to the trenches and cribs from 1955 to 1973.

Mark Byrnes, 200-ZP-1 groundwater task lead, said the extraction and treatment program is "particularly challenging due to the size of the carbon tetrachloride plume, and the fact that the highest concentrations are sometimes found deeper within the aquifer." However, he added that the project is "exciting

because we are evaluating new technologies that could provide the ability to significantly reduce carbon tetrachloride concentrations in the plume."

In fiscal year 2007, Byrnes emphasized, a full remedial action feasibility study will begin. The study is required under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA). The study will evaluate multiple technologies and approaches to mitigating the carbon tetrachloride plume. The study will also determine the final end state, through public participation. "Our action today in pumping and treating this groundwater plume is the prudent interim measure, put in place to give the CERCLA process a chance to work," Byrnes noted.

The contaminated water pumped from the five existing wells and the four new wells in the 200-ZP-1 operable unit travel through pipelines to a small treatment building just northwest of PFP. There, an air-stripper tower outside the building removes carbon tetrachloride from the water. Contaminated air from the tower is then routed inside the building and through a heater/chiller that removes moisture and then through a granulated activated carbon (GAC) filter that captures the carbon tetrachloride. Clean air is then released to the environment. When the GAC filter becomes saturated, the filter canister is sent off site to be regenerated by a commercial company.

Treated (clean) groundwater is re-injected into the aquifer at points up the hydraulic gradient from the carbon tetrachloride plume – the cleaned water is placed in the groundwater at points that will cause it to flow toward the contaminated plume – helping to dilute the plume and drive it to the extraction wells.

Byrnes expects pumping to continue through 2008 from the nine 200-ZP-1 extraction wells.

In the meantime, as the CERCLA process goes forward, new technologies, including air sparging and enhanced *in-situ* (in the groundwater) reductive dechlorination, will be evaluated to remove carbon tetrachloride from Hanford's groundwater. ■

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**In another success,** Fluor Hanford's Groundwater Remediation Project will shortly complete drilling all of the 15 wells required in calendar year (CY) 2005 work plans five months early. The Project has also begun planning and procurement work to support nine of the 15 wells required in CY 2006. Hanford's Tri-Party Agreement among the Department of Energy, the U.S. Environmental Protection Agency, and the Washington Department of Ecology requires 15 new wells to be drilled each year to monitor Site groundwater.

Fluor Hanford well-drilling lead Chris Wright said the work is cross-cutting. Drilling monitoring wells involves work all over the Site, interfacing with different contractors and different facilities. "The well-drilling program is the active implementation arm of the various monitoring programs across the Hanford Site," Wright commented. "We're extremely busy, trying to support the groundwater monitoring needs of the Site."

In addition to monitoring wells, Wright's program also drills extraction wells to remove groundwater for treatment. So far this year, the program has drilled several wells in the 200 Areas, including one near T Tank Farm in 200 West Area that was 410 feet deep. Other wells were drilled to support the ISRM barrier in the 100-D Area. Four wells support a new treatment system test in the 100-K Area. Work is taking place on a well in the 300 Area for Pacific Northwest National Laboratory. Average well depths vary between 100 and 300 feet, and subsurface conditions also vary widely.

"Every job is unique," Wright said. "It's unglamorous, and it often requires our people to be up at 4:30 a.m. and to work very long hours, but we try to provide what the Site needs and stay out of the headlines."

The group has not had a serious injury while working on any of the 43 wells drilled since the Groundwater Remediation Project transferred to Fluor Hanford in early 2003. Wright credits field operations under Brian Von Barga and geo-sciences teams under Craig Swanson for excellent planning, contamination control, and execution of the drilling work. ■



Drilling is taking place for well C4694 near T Plant to satisfy a TPA requirement for 2006.